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54: Title of invention - A powder detergent composition

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#### Specification

##### 1. Title of invention

A powder detergent composition

##### 2. Claim

(1) A powder detergent composition containing alpha-olefin sulfonate, alpha-sulfo fatty acid ester salt or alkylamine oxide, wherein the composition contains 15 - 30 weight % of zeolite, 0.1 - 5 weight % of a compound having an inclusion activity and 0.05 - 0.5 weight % of monoterpane alcohol or its derivative.

##### 3. Detailed explanation of the invention

( Industrial application )

The present invention refers to a powder detergent composition for laundering.

( The conventional technology and the problems solved by the invention )

The conventional powder detergent compositions for laundering contain usually linear alkylbenzene sulfonate, higher alcohol sulfate or higher alcohol ethoxy sulfate as the major active surfactants. A remarkable development of petrochemical industry in recent years has promoted the utilization of alpha-olefin sulfonate. Furthermore, since the ability of handling hard water, detergency and stain dispersing activity of alpha-sulfo fatty acid ester were found to be excellent and the biodegradability of the said surfactant was extremely good, alpha-sulfo fatty acid ester salt has been studied as the major surfactant in future.

On the other hand, it is recognized that alkylamine oxide is a surfactant capable of promoting the sudsing ability of the major

surfactant. However, the major problem of using the said compounds is ill-odor induced when the said compounds are degraded.

In other words, when a cloth is dried for a long time under the sunlight after the cloth is washed with a detergent containing alpha-olefin sulfonate and alkylamine oxide, the dried cloth may generate ill odor and provides unpleasant feeling to a person. It is said that the ill odor of the cloth may be aldehyde generated by the degradation of the said compounds. Furthermore, alpha-sulfo fatty acid ester salt is liable to hydrolysis in an alkaline system and generates ill odor. Consequently, it is necessary to remove ill odor in case of using the said surfactants.

( Method of solving the problems )

Under the said circumstance, the present inventors have made great efforts to find a detergent composition capable of altering chemically the ill odor or of promoting physically the adsorption of ill odor. As a result, it was found that a specific detergent composition could reduce the ill odor to the level which could be handled by a masking perfume. Thus, the present invention was accomplished by utilizing the said knowledge.

The present invention provides a powder detergent composition containing alpha-olefin sulfonate, alpha-sulfo fatty acid salt or alkylamine oxide, wherein the composition contains 15 - 30 weight % of zeolite (hereinafter, % means the weight %), 0.1 - 5 % of a compound having the inclusion activity, and 0.005 - 0.5 % of monoterpene alcohol or its derivatives.

In the present invention, if the concentrations of alpha-olefin sulfonate and alpha-sulfo fatty acid ester salt are less than 15 % and the concentration of alkylamine oxide is less than 5 %, the ill odor is effectively inhibited. When these surfactants are added to the detergent composition, ill odor is generated when the concentration is more than 1 %.

Zeolite used in the present invention is a type A zeolite of 0.1 - 10 microns in the average particle size and the concentration of the zeolite in the composition is 15 - 30 %. If the concentration of the zeolite is less than 15 %, ill odor is not reduced sufficiently. On the other hand, if the concentration exceeds 30 %, the detergent solution becomes cloudy inspite of the fact that the activity of removing ill odor is not promoted.

The compounds having the inclusion activity are preferably beta-cyclodextrin and may be other derivatives such as methylated beta-cyclodextrin, alpha-cyclodextrin, gamma-cyclodextrin, etc. The concentration of the inclusion compound in the composition is 0.1 - 5 %, preferably 0.5 - 3 %.

Monoterpene alcohols or their derivatives are linalol, geraniol, ctronellol and lower alkyl esters of the said compounds. These compounds are frequently used as the perfume. The concentration of the

said inclusion compounds in the composition is 0.005 - 0.5 %, preferably 0.01 - 0.3 %. However, it is true that the effect of the present invention can not be explained simply by the masking action of the perfume. Although a combined perfume other than monoterpene alcohol shows some masking activity, ill odor is not removed sufficiently. It is suggested that the catalytic action of zeolite and the inclusion activity of the inclusion compound may show some effect of removing ill odor. In other words, it is possible that the ill odor of the ingredients is reduced by the reaction between the ill odor ingredients and monoterpene alcohol and the ill odor molecules may be adsorbed with zeolite and be included with the inclusion compound. Other ingredients used in the detergent composition described in the present invention are not particularly specified. The conventional detergent compositions used in Japan contain usually 20 - 40 % of anionic surfactants such as linear alkylbenzene sulfonate, higher alcohol sulfate, higher alcohol ethoxy sulfate, higher fatty acid salts, etc.; 0.5 - 7 % of nonionic surfactants such as polyoxyethylene alkyl ether, etc.; 15 - 50 % of water soluble inorganic salts such as sodium carbonate, sodium silicate, sodium sulfate, etc.; anti-redeposition agents such as polyethyleneglycol, carboxymethyl cellulose, sodium polyacrylate, etc.; fluorescent whitening agents, perfumes and so on. Furthermore, a bleaching detergent composition may contain percarbonate, perborate, etc. and a fabric softening detergent contains quaternary ammonium salt of di-long chain alkyl compound.

( Effect of the invention )

According to the present invention, the detergent composition containing alpha-olefin sulfonate, alpha-sulfo fatty acid ester salt or alkylamine oxide does not generate ill odor.

( Practical examples )

The present invention is explained in detail in the following practical examples. However, the scope of the present invention is not limited to the following practical examples.

Practical example 1:

( Detergent composition )

sodium dodecylbenzene sulfonate	16 %
sodium alkyl sulfate (Cl4-15)	2
sodium alpha-olefin sulfonate (Cl6-18)	2
sodium alpha-sulfo fatty acid (Cl6-18) methyl ester	2
lauryl dimethylamine oxide	1
sodium carbonate	10
No. 2 sodium silicate	7.5
Type 4A zeolite	Table 1
beta-cyclodextrin	Table 1
monoterpene alcohol or its derivative	Table 1

polyethyleneglycol	2
enzyme (alkalase)	1
fluorescent dye	0.3
sodium sulfate	balance

Powder detergent compositions having the ingredients listed above and the comparative compositions without the said three ingredients ( alphaolefin sulfonate, alpha-sulfo fatty acid ester salt, and alkylamine oxide ) were prepared. The odor of a dried cloth after washing with the detergent compositions and the odor of the detergent base were evaluated.

( Evaluation of dried cloth after washing with the detergent composition )

Cloths were washed with the test detergent compositions under the washing conditions described in the following, and the odor of the cloth was evaluated with 4 examiners ( 25 years old male, 36 years old male, 36 years old female and 18 years old female ). The score was obtained as the means of the scores.

washer : Toshiba Ginga 2.2 kg  
 water volume : 30 L  
 amount of detergent : 40 g  
 amount of cloths : 1 kg (cotton shirt was worn for one day )  
 washing time : 7 min  
 Running water rinse : 8 min  
 spinning : 3 min  
 drying : outdoor, clear sky, one day

Standard

No ill odor on the washed cloth	1 point
weak ill odor	2
strong ill odor	3

A higher score means strong ill odor.

( Evaluation of ill odor of the detergent base )

The test detergent was placed in a 100 ml sample bottle. After sealing air-tightly, the bottle was stored at -5° C, 30° C or 40° C for 20 days, and the ill odor of the detergent base was evaluated by the sensory method. The evaluation was carried out by 4 examiners.

Evaluation standard:

O : no ill odor  
 O - Δ : slight ill odor  
 Δ : evident ill odor

Table 1:

a: detergent compositions prepared by the method described in the present invention, b: comparative examples, c: control, d: composition ( weight % ), e: evaluation, f: 4A type zeolite ( average particle size : 2 microns ), g: beta-cyclodextrin, h: linalool, i: citronellol, j: geraniol, k: linallyl acetate, l: combined perfume,

d 組 成 (重 量 %)	e 評 価	a 本 発 明 品				b 比 较 品				c 評 価
		1	2	3	4	5	6	7	8	
セオライトイ4A型 (平均粒径2μ)		25	25	25	25	25		25	25	25
β-サイクロデキストリンG		0.1	1.0	1.0	0.5	1.0	1.0		1.0	
リナロール		0.02					0.1			
シトロネロール			0.05					0.1		
ゲラニオール				0.02						
酢酸リナリルK					0.2					
調合香料1 (モノテルペンアルコール 又はその誘導体不含)						0.3				0.3
m 乾燥後の異臭		6	4	4	5	8	10	11	11	1
n 洗剤生地の 異臭の有無	40℃	○~△	○	○	○	△	△	△	△	○
	30℃	○	○	○	○	○~△	△	△	△	○
	-5℃	○	○	○	○	○~△	○~△	○~△	△	○

\* Celldex N manufactured by Nippon Shokuhin Kako Co. Ltd.  
 ( monoterpen alcohol or its derivative 0, m: ill odor after drying,  
 n: presence or absence of ill odor in the detergent base.